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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/615,687	07/09/2003	Walter G. Carrara	ERIM 0117 PUS	9727

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EXAMINER	
ALSOMIRI, ISAM A	

ART UNIT	PAPER NUMBER
3662	

DATE MAILED: 06/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/615,687	CARRARA ET AL.	
	Examiner	Art Unit	
	Isam A Alsomiri	3662	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 10-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The limitations "fast-time" and "slow-time" are unclear. For the purpose of examination, both limitations will read on any speed or time.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 9-12, 14-15, 17-18, and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by Moreira et al. US 5,812,082. Referring to claims 1 and 21, Moreira discloses in figures 3-4 a method of generating a synthetic aperture radar (SAR) image from a SAR signal, the SAR signal being indicative of a scene having a multitude

of point scatterers and distributed area scatterers (see Abstract), the method comprising: performing a first partial data stabilization to a point operation on the SAR signal to generate a partially stabilized SAR signal (3.1 and 3.2 figure 3); performing an along-track migration operation on the partially stabilized SAR signal to migrate SAR signal support of the scatterer in the scene as a function of along-track location of the scatterer in the scene in order to generate an along-track aligned partially stabilized SAR signal (3.3 to 3.9); performing a second partial data stabilization to a point operation on the along-track aligned partially stabilized SAR signal in order to complete the performance of the data stabilization to a point operation On the SAR signal and thereby generate an azimuth formatted SAR signal (3.14), and processing the azimuth formatted SAR signal to generate the SAR image (IMAGE DATA after 3.21).

Referring to claim 2. Moreira discloses in figures 3-4 the step of performing the first partial data stabilization to a point operation comprises: using on the SAR signal a first two-dimensional phase multiplier (3.2) in order to generate the partially stabilized SAR signal.

Referring to claim 3. Moreira discloses in figures 3-4 the step of performing the along-track migration operation comprises: using on the partially stabilized SAR signal an azimuth fast Fourier transformation FFT (3.3), a second two-dimensional phase multiplier (3.5 and 3.6), and an inverse azimuth FFT in order to generate the along-track aligned partially stabilized SAR signal (3.9).

Referring to claim 4. Moreira discloses in figures 3-4 the step of performing the second partial data stabilization operation comprises: using on the along-track aligned

partially stabilized SAR signal a third two-dimensional phase multiplier in order to generate the azimuth formatted SAR signal (3.10 and 3.14).

Referring to claim 9, Moreira discloses in figures 3-4 the step of performing the along-track migration operation on the partially stabilized SAR signal to migrate SAR signal support of the scatterer in the scene as a function of along-track location of the scatterer in the scene in order to generate an along-track aligned partially stabilized SAR signal comprises: performing an azimuth Fourier transform (3.3) of the partially stabilized SAR signal to reach a nominal azimuth image domain of the partially stabilized SAR signal; multiplying the nominal azimuth image domain Of the partially stabilized SAR signal by an azimuth quadratic phase function (3.7 H2); and performing an azimuth inverse Fourier transform (3.9) of the nominal azimuth image domain of the partially stabilized SAR signal in order to migrate SAR signal support of the scatterer in the scene as a function of along-track location of the scatterer in the scene to generate the along-track aligned partially stabilized SAR signal.

Referring to claim 10, it's inherent that the first partial data stabilization to a point operation is a slow-time data stabilization component of the data stabilization to a point operation.

Referring to claim 11, it's inherent the second partial data stabilization to a point operation is a fast-time data stabilization component of the data stabilization to a point operation.

Referring to claim 12, Moreira teaches the SAR signal is a spotlight SAR signal (see col. 8 lines 50-53).

Referring to claim 14, Moreira teaches the SAR signal is a scan mode SAR signal "ScanSAR" (see col. 3 lines 52-53).

Referring to claim 15, Moreira teaches processing the azimuth formatted SAR signal to generate the SAR image comprises: performing a range interpolation operation on the azimuth formatted SAR signal to generate an azimuth and range formatted SAR signal; and performing on the azimuth and range formatted SAR signal an azimuth and range fast Fourier transform in order to generate the SAR image (see col. 5 line 42 – col. 6 line 10).

Referring to claim 17, Moreira teaches performing an azimuth scaling operation on the azimuth formatted SAR signal prior to the performance of the range interpolation operation (see figure 3 [3.10]).

Referring to claim 18, Moreira discloses in figure 3-4 performing on the azimuth formatted SAR signal, in order, a range fast Fourier transform (3.6), a two-dimensional phase multiply (3.11 to 3.15), and an azimuth fast Fourier transform in order to generate the SAR image (3.19).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 5-8 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moreira et al. US 5,812,082. Referring to claims 5-8, Moreira inherently teaches

the SAR signal includes a plurality of pulses each having an azimuth chirp associated with a center transmitter frequency, and inherently the azimuth chirp having a quadratic component and a non-quadratic component, each pulse having a fast-time frequency. Furthermore, it's inherently that Moreira removes the chirp associated with the center transmitter frequency to obtain a clear data which represents the target; and even if it's not inherent, it's well known to remove the chirp associated with the transmitter center frequency in SAR systems to generate a clearer picture. The step of removing it is obvious and well known, and can be done many ways; whether by "a pulse-by-pulse phase shift and adjusting the fast-time frequency of the pulses of the SAR signal in order to remove from the pulses of the SAR signal the quadratic component of the azimuth chirp associated with the center transmitter frequency" or by other means. Therefore, it would have been obvious to perform a pulse-by-pulse phase shift and adjusting the fast-time frequency of the pulses of the SAR signal in order to remove from the pulses of the SAR signal the quadratic component of the azimuth chirp associated with the center transmitter frequency to obtain the real target signal with less clutter.

Referring to claim 13, Moreira does not teach the SAR signal is a strip map SAR signal. However, strip map SAR are well known and would be obvious to modify Moreira to use strip map SAR signals for less and simpler processing

Claims 16 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moreira et al. US 5,812,082 in view of Cho US 6,670,907. Moreira is silent about the step of processing the azimuth formatted SAR signal to generate the SAR image comprises: performing a Stolt interpolation and an azimuth and range fast Fourier

transform on the azimuth formatted SAR signal in order to generate the SAR image. However, Stolt interpolation in SAR systems is well known. Cho teaches STOLT interpolation, range FFT and azimuth FFT (see figure 5 [40] [42] and [46]). It would have been obvious to modify Moreira's system to include the Stolt interpolation to obtain better resolution (range and azimuth).

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moreira et al. US 5,812,082 in view of Krikorian et al. US 6,020,843. Moreira is silent about performing a polar format algorithm range interpolation operation on the azimuth formatted SAR signal in order to generate the SAR image. However, polar format algorithm range interpolation is well known. Krikorian teaches the polar format algorithm range interpolation (see figure 2 [28] [31]). It would have been obvious to modify Moreira's system to include the polar format algorithm range interpolation for its robust imaging during applications utilizing very wide-angle synthetic apertures.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art cited to (Charles et al.; Cho '369; Garren; Abatzoglou; Mittermayer et al.; Murata et al.; Normant) show various radar SAR systems including different methods of focusing and images improving.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Isam A Alsomiri whose telephone number is 703-305-5702. The examiner can normally be reached on Monday-Thursday and every other Friday (8:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas H Tarcza can be reached on 703-306-4171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Isam Alsomiri

JOHN B. SOTOMAYOR
PRIMARY EXAMINER

May 11, 2004